



Sheet # 5

(Normalization)

1. Consider the relation:

Book(accno, author, author_address, title, borrower_no, borrower_name, pubyear)

With the following functional dependencies

accno -> title

accno -> pubyear

author -> accno

accno -> author

author -> author_address

accno -> borrower_no

borrower_no -> borrower_name

- i. Normalize the relation. Clearly show the steps.
- ii. For each decomposed relation identify the functional dependencies that apply and identify the candidate key.

2. Consider the following instance of a relation R:

saleID	salesman	regNo	make	office
42	B. Honest	VY 34718	Opel	City
53	W. Gates	PQ 11112	Ford	Redwood
87	B. Honest	MX 32781	Ford	City
99	L. R. Harald	AB 1234	Porche	City

The functional dependencies of R, not including trivial ones, are:

1. saleID -> salesman regNo make office
2. salesman -> office
3. regNo -> make

Decompose the relation into third normal form. For each step of the decomposition procedure, state what functional dependency it is based on, and give the relation schemas after the step has been carried out?

- 3. Table 4-3 contains sample data for parts and for vendors who supply those parts. In discussing these data with users, we find that part numbers (but not descriptions) uniquely identify parts and that vendor names uniquely identify vendors.**

TABLE 4-3 Sample Data for Parts and Vendors

Part No	Description	Vendor Name	Address	Unit Cost
1234	Logic chip	Fast Chips	Cupertino	10.00
		Smart Chips	Phoenix	8.00
5678	Memory chip	Fast Chips	Cupertino	3.00
		Quality Chips	Austin	2.00
		Smart Chips	Phoenix	5.00

- a. Convert this table to a relation (named PART SUPPLIER) in first normal form. Illustrate the relation with the sample data in the table.
- b. List the functional dependencies in PART SUPPLIER and identify a candidate key.
- c. In what normal form is this relation?
- d. Develop a set of 3NF relations from PART SUPPLIER.

Sheet # 5 (Cont.)

4. Table 4-4 shows a relation called **GRADE REPORT** for a university. Your assignment is as follows:

TABLE 4-4 Grade Report Relation

Grade Report								
StudentID	StudentName	CampusAddress	Major	CourseID	CourseTitle	Instructor Name	Instructor Location	Grade
168300458	Williams	208 Brooks	IS	IS 350	Database Mgt	Codd	B 104	A
168300458	Williams	208 Brooks	IS	IS 465	Systems Analysis	Parsons	B 317	B
543291073	Baker	104 Phillips	Acctg	IS 350	Database Mgt	Codd	B 104	C
543291073	Baker	104 Phillips	Acctg	Acct 201	Fund Acctg	Miller	H 310	B
543291073	Baker	104 Phillips	Acctg	Mkgt 300	Intro Mkgt	Bennett	B 212	A

- Draw a relational schema and diagram the functional dependencies in the relation.
- In what normal form is this relation?
- Decompose **GRADE REPORT** into a set of 3NF relations.

5. Table 4-5 shows a shipping manifest. Your assignment is as follows:

TABLE 4-5 Shipping Manifest

Shipment ID:	00-0001	Shipment Date:	01/10/2010		
Origin:	Boston	Expected Arrival:	01/14/2010		
Destination:	Brazil				
Ship Number:	39	Captain:	002-15 Henry Moore		
Item Number	Type	Description	Weight	Quantity	TOTALWEIGHT
3223	BM	Concrete Form	500	100	50,000
3297	BM	Steel Beam	87	2,000	174,000
				Shipment Total:	224,000

- Draw a relational schema and diagram the functional dependencies in the relation.
- In what normal form is this relation?
- Decompose **MANIFEST** into a set of 3NF relations.

Sheet # 5 (Cont.)

6. Table 4-8 shows a portion of a shipment table for a large manufacturing company. Each shipment (identified by Shipment#) uniquely identifies the shipment Origin, Destination, and Distance. The shipment Origin and Destination pair also uniquely identifies the Distance.

TABLE 4-8 Shipment Relation

Shipment#	Origin	Destination	Distance
409	Seattle	Denver	1,537
618	Chicago	Dallas	1,058
723	Boston	Atlanta	1,214
824	Denver	Los Angeles	975
629	Seattle	Denver	1,537

- a. Develop a diagram that shows the functional dependencies in the SHIPMENT relation.
b. In what normal form is SHIPMENT? Why?
c. Convert SHIPMENT to third normal form if necessary. Show the resulting table(s) with the sample data presented in SHIPMENT.
7. Figure 4-32 shows a class list for Millennium College. Convert this user view to a set of 3NF relations using an enterprise key. Assume the following:
- An instructor has a unique location.
 - A student has a unique major.
 - A course has a unique title.

MILLENNIUM COLLEGE CLASS LIST FALL SEMESTER 201X			
COURSE NO.: IS 460			
COURSE TITLE: DATABASE			
INSTRUCTOR NAME: NORMA L. FORM			
INSTRUCTOR LOCATION: B 104			
STUDENT NO.	STUDENT NAME	MAJOR	GRADE
38214	Bright	IS	A
40875	Cortez	CS	B
51893	Edwards	IS	A

FIGURE 4-32 Class list (Millennium College)

*With best wishes,
Dr. HatemSayed Ahmed,
Eng. MarwaBadr*